



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

09/550,990 04/17/00 CHAN

K YOR9-1996-01

EXAMINER

MMC2/0925

ROBERT M TREPP
IBM CORPORATION INTELLECTUAL PROPERTY LA
PO BOX 218
YORKTOWN HEIGHTS NY 10598

OWENS, D

ART UNIT

PAPER NUMBER

2811

DATE MAILED:

09/25/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/550,990

Applicant(s)

CHAN ET AL.

Examiner

Douglas W Owens

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 9-12, 22, 23, 30-33, 37-43, 58-60, 63 and 64 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5) ☐ Claim(s) ____ is/are allowed.

6) ☒ Claim(s) 9-12, 22, 23, 30-33, 37-43, 58-60, 63 and 64 is/are rejected.

7) ☐ Claim(s) ____ is/are objected to.

8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 April 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Drawings

1. Applicant is required to submit a proposed drawing correction in reply to this Office action.
2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the additional layer of conductive material between a metal layer and first dielectric layer as required in claims 58 and 37 must be shown or the feature(s) canceled from the claim(s). The drawings also fail to show a field effect transistor having spaced apart metal-semiconductor compound regions with a raised epitaxial channel region. No new matter should be entered.

Specification

3. Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

- (1) if a machine or apparatus, its organization and operation;
- (2) if an article, its method of making;
- (3) if a chemical compound, its identity and use;

Art Unit: 2811

- (4) if a mixture, its ingredients;
- (5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

4. The abstract of the disclosure is objected to because lines 8-11 refers to purported merits of the claimed invention and draws a comparison to the prior art.

Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 37-43, 58-60, and 63 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no disclosure of a field effect transistor having spaced apart metal-semiconductor regions and including a conductive material between a (reacted) metal layer and a first dielectric layer.

Regarding claim 63, there is no disclosure of a field effect transistor with spaced apart metal-semiconductor compound regions including a raised epitaxial channel region.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 2811

8. Claims 22, 23, 58-60 and 64 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Claim 22 recites the limitation "...the sidewalls..." in line 10. There is insufficient antecedent basis for this limitation in the claim.

10. Claim 58 recites the limitation "...between said metal..." in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 9 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by US patent No. 5,159,416 to Kudoh.

Regarding claim 9, Kudoh teaches a field effect transistor comprising:

a semiconductor substrate (10).

two Schottky metal semiconductor compound regions (15, 16) forming source/drain regions defining a channel there between;

a first dielectric layer (98) on the source and drain;

a gate dielectric (13) on the channel; and

a conductive layer (14) on the gate dielectric to form a gate.

Art Unit: 2811

Regarding claim 10, Kudoh teaches a field effect transistor, wherein the metal semiconductor regions are metal silicide.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kudoh as applied to claims 9 and 10 above, and further in view of US patent No. 5,196,357 to Boardman et al.

Kudoh does not teach a field effect transistor, wherein the conductive layer extends over the first dielectric layer and a portion of the source and drain to form a T-shaped gate and reduce gate resistance. Boardman et al. teaches a T-shaped gate structure that would have extended over the first dielectric layer and a portion of the source and drain if it had been incorporated into the device taught by Kudoh. It would have been obvious to one of ordinary skill in the art to incorporate the gate structure taught by Boardman et al. since it is desirable to make MOSFETs with improvements in performance and reliability (Boardman et al., Col. 1, lines 26-29).

15. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent No. 5,475,244 to Koizumi et al. in view of US patent No. 5,418,391 to Huang.

Koizumi et al. teaches a field effect transistor comprising:

a substrate (409-2);
two spaced apart heavily doped source/drain semiconductor regions (409-10) comprising SiGe or GaAs;
a first dielectric layer (409-11) on the source/drain regions;
a gate dielectric (409-4) on the channel region; and
a conductive layer (409-5) on the gate dielectric forming a gate.

Koizumi et al. does not teach a semiconductor substrate. Koizumi et al. teaches an insulating substrate, which is employed for known advantages over semiconductive substrates. Semiconductive substrates are well known and it is not considered inventive to employ such a substrate since it is considered a matter of obvious design choice.

Koizumi et al. does not teach a gate dielectric on the sidewalls of the spaced apart semiconductor regions. Huang teaches a field effect transistor having a gate dielectric on the sidewalls of the spaced apart semiconductor regions. It would have been obvious to one of ordinary skill in the art to employ the gate structure, and subsequently the gate dielectric used in the device taught by Huang, since it is desirable to make MOSFETs with improvements in performance and reliability, which can be achieved with the gate structure used by Huang.

16. Claims 30 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kudoh in view of US patent No. 4,521,446 to Coleman, Jr. et al.

Kudoh teaches a field effect transistor comprising:

a semiconductor substrate (10);

two spaced apart titanium metal-semiconductor compound regions (15,16) forming source/drain regions;
a first dielectric layer (98) on the source/drain regions; and
a conductive gate layer.

Kudoh does not teach a gate dielectric layer comprising TiO_2 . Coleman, Jr. et al. teaches a gate dielectric layer comprising TiO_2 . It would have been obvious to one of ordinary skill in the art to incorporate the TiO_2 layer taught by Coleman, Jr. et al. into the device taught by Kudoh, since it is desirable to increase yield in device fabrication (See Coleman, Jr. et al., Col.1, lines 25-35).

17. Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kudoh and Coleman, Jr. et al. as applied to claims 30 and 33 above, and further in view of Boardman et al.

Neither Kudoh nor Coleman, Jr. et al. teach a field effect transistor, wherein the conductive layer extends over the first dielectric layer and a portion of the source and drain to form a T-shaped gate and reduce gate resistance. Boardman et al. teaches a T-shaped gate structure that would have extended over the first dielectric layer and a portion of the source and drain if it had been incorporated into the device taught by Kudoh. It would have been obvious to one of ordinary skill in the art to incorporate the gate structure taught by Boardman et al. since it is desirable to make MOSFETs with improvements in performance and reliability.

18. Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kudoh.

Art Unit: 2811

Kudoh teaches a field effect transistor with raised channel region between the source and drain regions. Kudoh does not teach a raised epitaxial channel. It would have been obvious to one of ordinary skill in the art to use epitaxial silicon, since it is desirable to use high quality silicon. Additionally, it would have been obvious to use a known material that is well suited for the intended use.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

DWO
September 21, 2001

Steven Loke
Primary Examiner

